IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Steven D. SLONAKER	Group Art Unit: 2128
Appln. No.	: 10/538,763	Examiner: Kibrom K. Gebresilassie
Filed	: June 10, 2005	Confirmation No.: 5550
For	: METHOD AND SYSTEM FOR RECONSTRUCTING ABERRATED IMAGE PROFILES THROUGH SIMULATION	

PRE-APPEAL BRIEF REQUEST FOR REVIEW

U.S. Patent and Trademark Office
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Sir:

   This request is being filed with a Notice of Appeal and in response to the Final Office Action dated December 3, 2010. Reconsideration is requested in view of the following remarks.

   In the Final Office Action, claims 1-6, 9-13, 15, 21-26 and 46-48 are rejected under 35 U.S.C. §102(e) as being anticipated by US Pat. 6,653,032 ("Miwa"); claims 7, 8, 14, and 27-29 are rejected under 35 U.S.C. §103(a) as being unpatentable over Miwa in view of US Pat. 6,493,063; and claims 42-45 are rejected under 35 U.S.C. §103(a) as being unpatentable over Miwa in view of US Pat. 5,528,118. Claim 49 is rejected under 35 U.S.C. §112, 2nd paragraph, as being indefinite.

   Independent Claim 1 - The invention relates to reconstructing aberrated image profiles through simulation. In embodiments, a setup phase involves performing full image simulations to create response surface functional relations between an image profile of interest and a value of an aberration component. This computationally intensive setup phase is performed once to create the response surface functional relations. After the setup phase, an image profile for a lens is quickly calculated using a specified set of aberration values and the response surface functional relations, without repeatedly performing the computationally intensive full image simulation. Claim 1 recites:

> ... building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component;

   The Examiner asserts that Miwa discloses this feature of claim 1 at two separate passages: (i) col. 3, lines 19-23 and (ii) FIG. 5 (Office Action, pages 10-11). Applicants respectfully disagree, and submit

that the Examiner is improperly picking and choosing features from unrelated passages of the Miwa document in an attempt to anticipate the claimed invention.

At the first passage (i.e., col. 3, lines 19-23), Miwa describes perceived problems with background prior art (i.e., Aida et al.). This passage mentions "response surface functions," however there is no disclosure that these response surface functions are <u>based on a value of an aberration component</u>. Instead, the background prior art (Aida) produces response surface functions <u>of CD values</u> and calculates exposure energy and focus offset from these response surface functions. The Aida response surface functions are functions of CD (critical dimension) values, which are not values of aberration components, and there is no mention in Miwa that the Aida response surface functions have anything to do with a value of an aberration component. As such, lines 19-23 of col. 3 of Miwa do not disclose *building response surface functional relations ... wherein the response surface functional relations are based on a value of an aberration component*, as in claim 1.

The Examiner separately asserts that Miwa discloses "wherein the response surface functional relations are based on a value of an aberration component" at FIG. 5. Thus, the Examiner is asserting that Miwa discloses *building response surface functional relations* at the first passage (i.e., col. 3, lines 19-23), and that Miwa separately discloses *wherein the response surface functional relations are based on a value of an aberration component* at the second passage (i.e., FIG. 5). <u>The Examiner is picking and choosing unrelated features from Miwa's background (i.e., the Aida response surface function described at col. 3) and Miwa's invention (i.e., the data plot at FIG. 5) in an attempt to arrive at this single recited feature, which is clear error in an anticipation rejection under §102</u>. To anticipate a claim, a reference "must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements 'arranged as in the claim.'" *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075 (Fed. Cir. 2008); see also, e.g., *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972) ("[The] reference must clearly and unequivocally disclose the claimed [invention] or direct those skilled in the art to the [invention] without any need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference" (emphasis in original)).

Miwa does not disclose that the description in the Background (col. 3) is related to, or used with, the subject matter of FIG.5. For example, Miwa does not disclose that the response surface functions described in the Background (col. 3) are based on aberration values, and Miwa does not disclose that the data plot in FIG. 5 has anything to do with the response surface functions described in the Background. It is improper for the Examiner to pick and choose unrelated features from Miwa's Background (col. 3) and FIG. 5 in an attempt to formulate an anticipation rejection under §102. Therefore, the combination of Miwa's col. 3 and FIG. 5 cannot anticipate *building response surface functional relations ... wherein the response surface functional relations are based on a value of an aberration component*, as in claim 1.

In the event that the Examiner is relying only on FIG. 5 as reading on the recited building, Applicants submit that FIG. 5 alone does not disclose *building response surface functional relations … between variables of lens characteristics and an image profile of interest using the simulation calculations, wherein the response surface functional relations are based on a value of an aberration component.* Instead, FIG. 5 shows two separate data plots of exposure energy versus focus offset. The first of the data plots, e.g., FIG. 5 (1), shows exposure energy versus focus offset without aberration. The second, e.g., FIG. 5 (2), shows exposure energy versus focus offset with third-order spherical aberration for 0.05λ. One of ordinary skill in the art would readily recognize that Miwa's FIG. 5 does not show or otherwise disclose response surface functional relations between variables of lens characteristics and an image profile of interest, wherein the response surface functional relations are based on a value of an aberration component. In fact, Miwa's FIG. 5 is not even a response surface functional relation. Instead, FIG. 5 is merely a line-chart of exposure energy versus focus.

In the Response to Arguments section of the Office Action, the Examiner alludes to Miwa's FIG. 6 as being a three dimensional response surface relation. It is unclear whether the Examiner is now relying on FIG. 6 as reading on the recited *building response surface functional relations…*, or if the Examiner is relying on some combination of: col. 3, FIG. 5, and FIG. 6 as disclosing this recited feature. Again, the Examiner appears to be picking and choosing disparate, unrelated portions of Miwa to read on a single feature of claim 1. In any event, Miwa's FIG. 6 does not disclose *building response surface functional relations … between variables of lens characteristics and an image profile of interest using the simulation calculations*, as recited in claim 1. Instead, Miwa's FIG. 6 illustrates a method for measuring the aberration of a projection lens. The three dimensional surface plot in FIG. 6 (step 4) represents a measurement of the lens aberration at each x-y location on the lens. This three dimensional surface plot is merely measured data, and does not define a relationship between (i) variables of lens characteristics and (ii) an image profile of interest. Therefore, FIG. 6 does not disclose *building response surface functional relations … between variables of lens characteristics and an image profile of interest using the simulation calculations*, as in claim 1.

Moreover, even assuming *arguendo* that the three dimensional surface plot in FIG. 6 can reasonably be interpreted as a response surface functional relation between variables of lens characteristics and an image profile of interest, there is no mention in Miwa that the surface plot of FIG. 6 is built using the simulation calculations. Claim 1 recites **building** *response surface functional relations … **using the simulation calculations**.* Miwa, on the other hand, describes that the surface plot in FIG. 6 is <u>created using measurements of the physical lens</u>. Since Miwa's FIG. 6 is created using <u>physical measurements</u>, instead of the recited <u>simulation calculations</u>, Miwa's FIG. 6 cannot reasonably

be said to read on *building response surface functional relations ... between variables of lens characteristics and an image profile of interest using the simulation calculations,* as recited in claim 1.

In addition to the *building response surface functional relations* ..., claim 1 also recites:

> ... calculating an image profile using specified aberration values
> of a lens in conjunction with the response surface functional relations ....

The Examiner asserts Miwa discloses the recited *calculating an image profile* ... at FIG. 5 (Action, page 11). It is evident from these remarks that the Examiner is equating the graph in FIG. 5 to both the recited *building response surface functional relations* and the recited *calculating an image profile*. However, this interpretation is not consistent with the language of claim 1. Claim 1 recites calculating an image profile <u>using</u> the specified aberration values of a lens <u>in conjunction with the response surface functional relations</u>. It is impossible for the single graph (e.g., Miwa's FIG. 5) to be both the response surface functional relations and the image profile, since the plain language of the claim requires that the image profile be calculated <u>using</u> the response surface functional relations.

The Examiner explicitly states at the top of page 11 that "Fig. 5 shows the response surface functional relation...." Based on this interpretation, in order for Miwa to read on the recitation *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations,* Miwa would necessarily have to disclose using the graph of FIG. 5 to calculate an image profile. Put another way, given the Examiner's interpretation that FIG. 5 shows the response surface functional relations, Miwa would have to use the data shown in FIG. 5 to calculate the image profile in order to read on the recitation of *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations.* However, <u>Miwa does not disclose calculating an image profile **using** the graph in FIG. 5</u>. In fact, Miwa does not disclose calculating anything using the graph in FIG. 5. Instead, the data plotted in FIG. 5 merely demonstrates that exposure energy and focus offset may fluctuate based on different aberrations. However, there is no mention of subsequently using the graph of FIG. 5 to calculate anything, much less an image profile. Therefore, using the Examiner's own interpretation that FIG. 5 reads on the recited "response surface functional relations," it logically follows that Miwa does not disclose *calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations,* as recited in claim 1.

Independent Claims 42, 46, and 47 – For independent claims 42, 46, and 47, Applicants incorporate by reference the above-noted arguments, and also the arguments at pages 22-23 and pages 26-28 of the Amendment dated September 7, 2010.

Dependent Claim 15 – The Examiner refuses to accord claim 15 any patentable weight (Action, page 9). It is improper for the Examiner to simply ignore claim 15. Contrary to the Examiner's

assertions, claim 15 does not "merely recite the purpose of a process or the intended use of a structure." Instead, claim 15 further defines claim 1 by reciting how a step of a process is performed. Reciting how something is performed is not the same as reciting the purpose of a process. Therefore, the Examiner is not free to simply disregard claim 15, and instead must consider this recitation for what it fairly conveys to one of ordinary skill in the art.

In any event, Miwa does not disclose *the performing simulation calculations for various levels for each aberration component comprises performing a full simulation calculation, and the calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile*, as recited in claim 15. Miwa does not specify the manner in which the image simulations are calculated. In Miwa's invention, only the inputs (i.e., data values representing a given exposure tool's current state of performance) and the outputs (i.e., the process window) are specified; however, the calculation method for getting from the inputs to the outputs is not disclosed, such that it is impossible to discern whether operates in the manner recited in claim 15.

Dependent Claim 49 – The Examiner refuses to examine claim 49 with respect to prior art due to alleged indefiniteness (Action, pages 8-9). This is a clear error, since claim 49 is described at pages 38-41 of the specification and FIG. 5 in a manner such those skilled in the art would understand what is claimed when the claim is read in light of the specification, instead of reading the claim in a vacuum as the Examiner appears to have done. Moreover, by refusing to examine claim 49, the Examiner is improperly engaging in 'piecemeal examination' (MPEP 707.07g).

In any event, the applied art does not teach claim 49. Claim 49 which depends from claim 1. As noted above with respect to claim 1, the Examiner asserts that the data plotted in Miwa's FIG. 5 represents both the *response surface functional relations* and the *image profile*. However, this interpretation is impossible to reconcile with the language of claim 49. In particular, claim 49 recites that the calculating step is performed after the building step such that the response surface functional relations that are used in the calculating the image profile are built prior to the image profile being calculated. A single data plot, such as that shown in Miwa's FIG. 5, cannot meet the temporal requirements recited in claim 49. Therefore, Miwa cannot be said to render claim 49 unpatentable.

Reconsideration of the Final Office Action and allowance of the present application and all claims therein are respectfully requested and believed to be appropriate.

Respectfully submitted,

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